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**Ahn**

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(54) **DEVICE AND METHOD FOR CONTROLLING ACTIVATION OF CRIME PREVENTION EQUIPMENT**

(56) **References Cited**

U.S. PATENT DOCUMENTS

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2008/0068158 A1\* 3/2008 Sumiyoshi ..... G08B 13/1672  
340/540

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FOREIGN PATENT DOCUMENTS

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KR 10-2001-0100165 A 11/2001  
KR 10-2001-0103829 A 11/2001  
KR 10-2003-0059027 A 7/2003  
KR 10-0502718 B1 7/2005

(Continued)

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(52) **U.S. Cl.**

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(58) **Field of Classification Search**

CPC ..... G08B 15/00; G08B 15/004; G08B 21/02

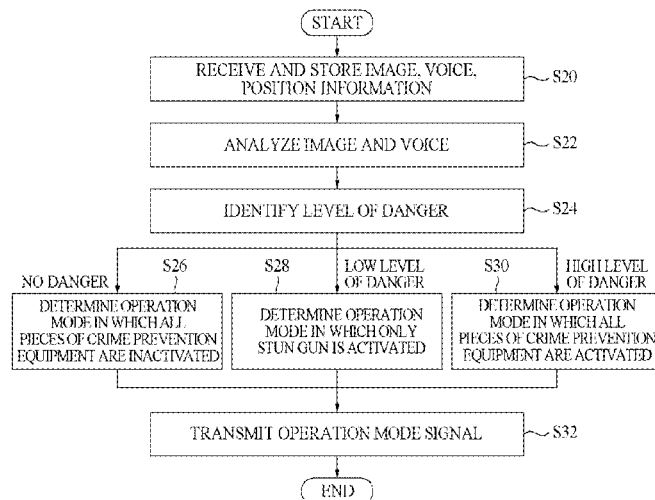
USPC ..... 348/143, 148, 151, 152, 157

See application file for complete search history.

(57) **ABSTRACT**

Provided is a device and method for controlling the activation of crime prevention equipment, which are capable of fundamentally blocking the accidental use of the crime prevention equipment and varying operation modes of the crime prevention equipment in response to dangerous situations. The provided device may include: an image analysis unit extracting an image of another person from an image from a user terminal and analyzing a motion of the other person based on the extracted image of the other person; a voice analysis unit analyzing a frequency of voice from the user terminal and extracting a preset search word from the voice; a danger identification unit identifying a level of danger of a user based on results of the image analysis unit and the voice analysis; and an operation mode determination unit determining an operation mode in which crime prevention equipment possessed by the user is activated according to the level of danger identified by the danger identification unit, and transmitting a signal corresponding to the operation mode to the user terminal.

**19 Claims, 4 Drawing Sheets**



(56)

**References Cited**

FOREIGN PATENT DOCUMENTS

KR 10-2011-0123968 A 11/2011  
KR 10-2013-0032804 A 4/2013

\* cited by examiner

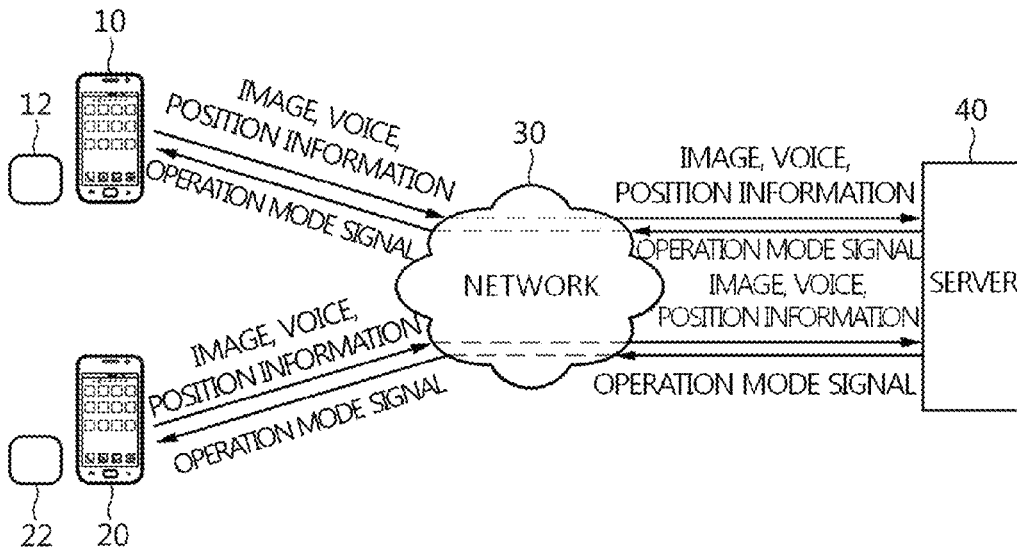


Fig. 1

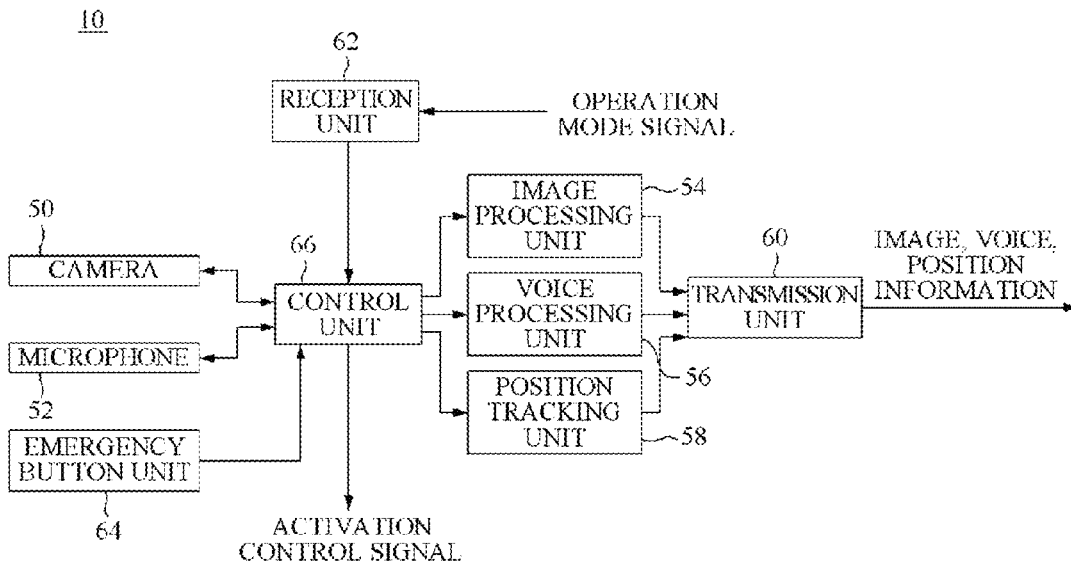


Fig. 2

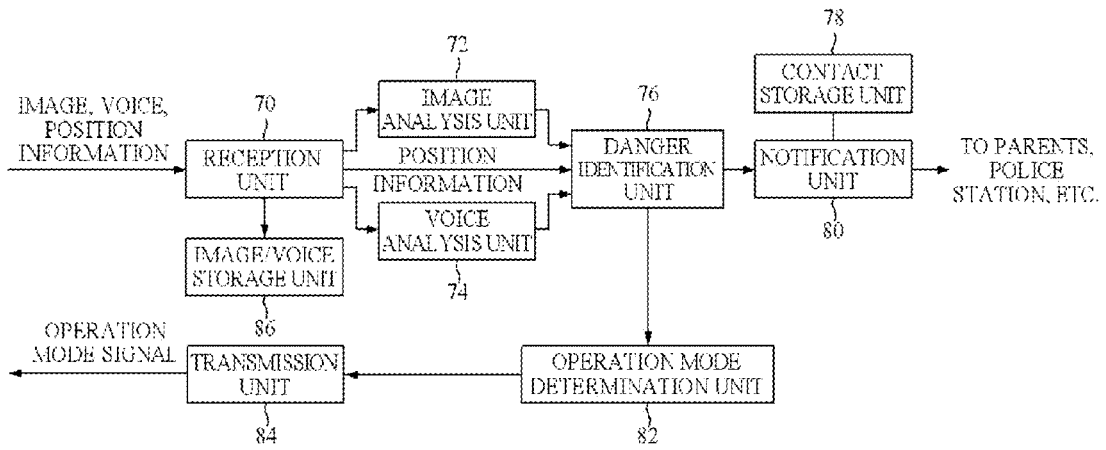


Fig. 3

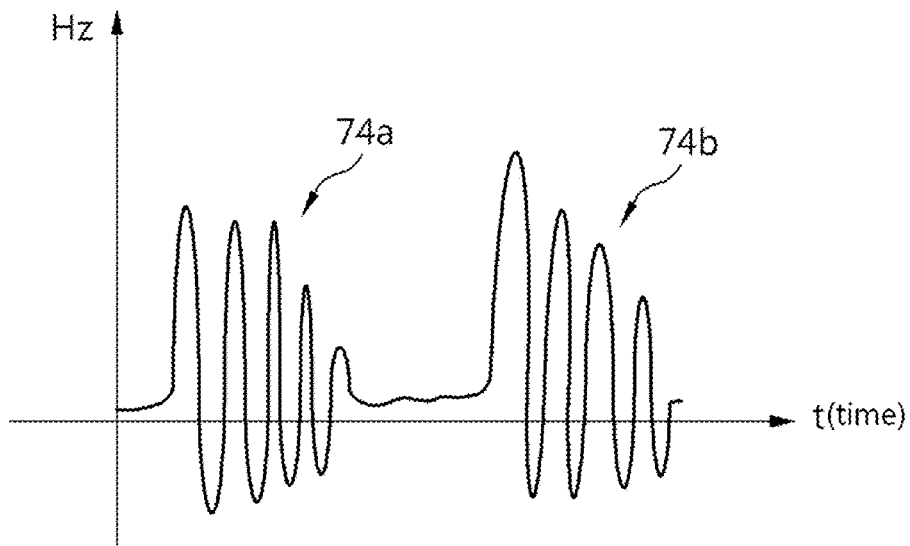


Fig. 4

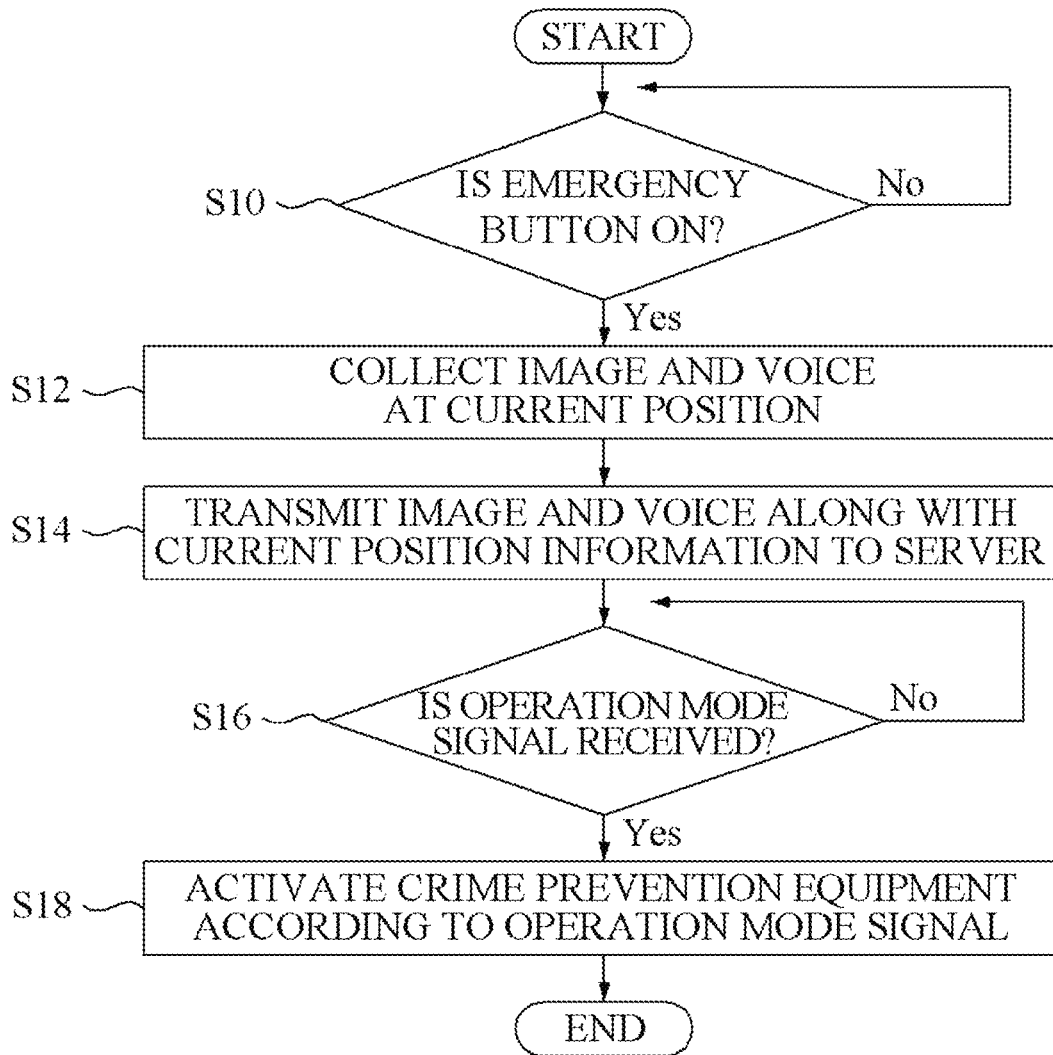


Fig. 5

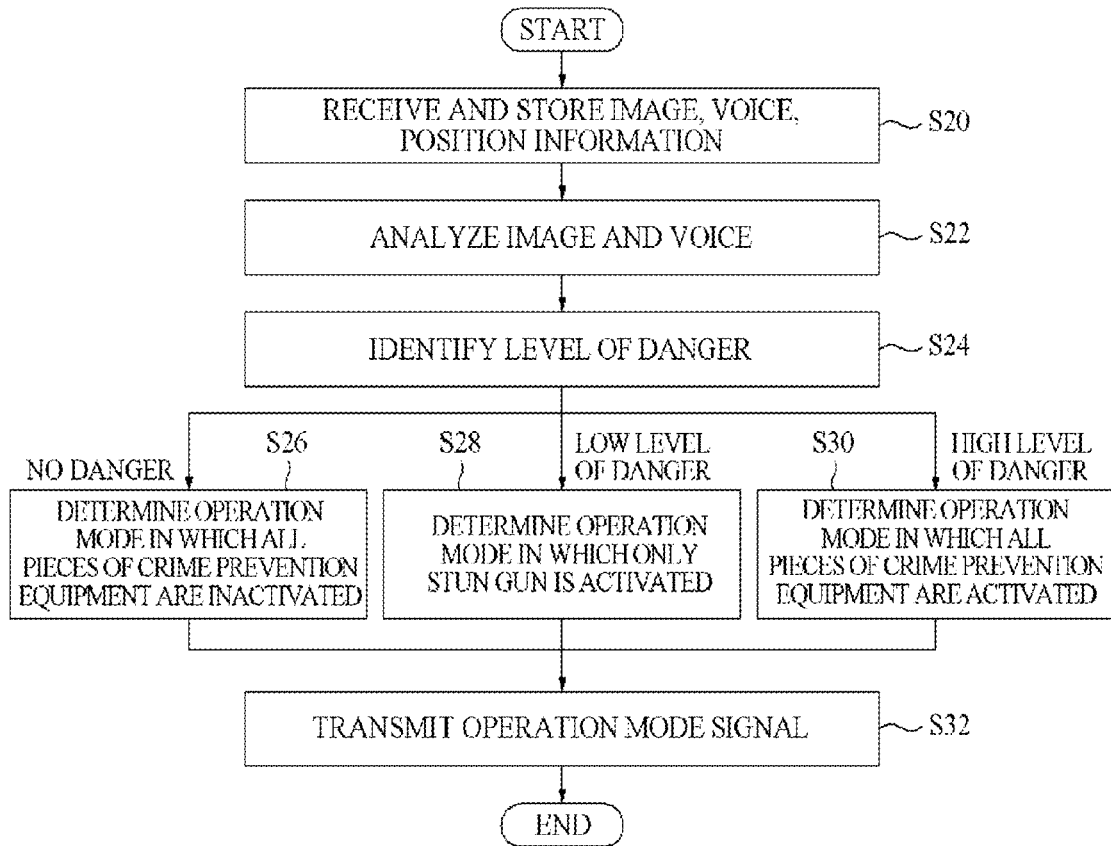


Fig. 6

**DEVICE AND METHOD FOR  
CONTROLLING ACTIVATION OF CRIME  
PREVENTION EQUIPMENT**

TECHNICAL FIELD

The present disclosure relates to a device and method for controlling the activation of crime prevention equipment, and more particularly, to a device and method for remotely controlling the activation of crime prevention equipment, such as a stun gun and gas sprayer.

The present disclosure claims priority of Korean Patent Application No. 10-2013-0052535 filed on May 5, 2013, the entire contents of which are hereby incorporated by reference.

BACKGROUND ART

In general, as society progresses and becomes complicated, cases where children become the target of crime is increasing, and crime that targets children, such as child kidnapping, violence against a child, etc. is gradually increasing.

Thus, although in order to protect children from crime, parents take their children to and from school and training has been reinforced so that they do not follow strangers, a rate of crime that targets children has not decreased.

Thus, children carry the stun gun or gas sprayer or carry equipment in which the stun gun or gas sprayer is functionally integrated with a portable phone.

As a related prior art, Korean Patent Publication No. 2001-0100165 (PERSONAL SECURITY SYSTEM AND DEVICE USING A MOBILE PHONE TERMINAL) disclosing that a user in a situation in which a damage by crime is predicted may automatically send an aid request to a security service provider, easily securing his or her safety for a certain time.

The invention in Korean Patent Publication No. 2001-00100165 includes an electrical shock unit which is disposed in the housing of a mobile phone terminal to use the battery of the mobile phone terminal as a power source and has an electrode that may be exposed from the housing; an emergency switch that is electrically connected to the control unit of the mobile phone terminal to be able to drive the power switch of the electrical shock unit and simultaneously generate and transmit an electrical signal notifying the control unit of the mobile phone terminal that the electrical shock unit has been driven; a security service provider's phone number storage unit allocated to a storage device in the control unit of the mobile phone terminal; an automatic aid control program that is stored in the control program storage unit of the control unit of the mobile phone terminal and automatically executed upon on the turn on of the emergency switch to perform searching for a phone number stored in the security service provider's phone number storage unit, then automatically dialing by using the phone number and transmitting user position identification voice to the security service provider; and the security service provider that checks the position of the terminal through a position description by the voice provided by a mobile phone terminal user in response to the signal of the mobile phone terminal and then provides an aid service.

As another related prior art, there is Korean Patent Publication No. 2001-0103829 (PERSONAL SECURITY SYSTEM AND DEVICE USING MOBILE PHONE TERMINAL) that contains contents having the same purpose as the invention in Korean Patent Publication No. 2001-0100165.

The invention in Korean Patent Publication No. 2001-0103829 includes a gas sprayer which is disposed in the housing of a mobile phone terminal and may control the spraying of a gas by a solenoid valve electrically connected to the battery of the mobile phone terminal; an emergency switch that is electrically connected to the solenoid valve of the gas sprayer and to the control unit of the mobile phone terminal to be able to drive the solenoid valve switch of the gas sprayer and simultaneously output an electrical signal notifying the control unit of the mobile phone terminal that the gas sprayer has been driven; a security service provider's phone number storage unit allocated to a storage device in the control unit of the mobile phone terminal; an automatic aid control program that is stored in the control program storage unit of the control unit of the mobile phone terminal and automatically executed upon on the turn on of the emergency switch to perform searching for a phone number stored in the security service provider's phone number storage unit, then automatically dialing by using the phone number and transmitting user position identification voice to the security service provider; and the security service provider that checks the position of the terminal through a position description by the voice provided by a mobile phone terminal user in response to the signal of the mobile phone terminal and then provides an aid service.

However, the above-described typical arts and related prior arts may operate accidentally by the error or curiosity of a user (child) and accordingly, it is possible to astonish or hurt surrounding people against his or her will.

Although the related prior arts enable the electrical shock unit or gas sprayer to operate only when the emergency switch is pressed for a certain time, there is still a possibility that they may accidentally operate by the error or curiosity of a child.

DISCLOSURE OF THE INVENTION

Technical Problem

Embodiments provide a device and method for controlling the activation of crime prevention equipment that is capable of fundamentally blocking the accidental use of the crime prevention equipment and changing the operation modes of the crime prevention equipment in response to dangerous situations.

Technical Solution

In one embodiment, a device for controlling activation of crime prevention equipment includes an image analysis unit extracting an image of a person the user terminal and analyzing a motion of the person based on the extracted image of the person; a voice analysis unit analyzing a frequency of voice from the user terminal and extracting a preset search word from the voice; a danger identification unit identifying a level of danger of a user based on results of the image analysis unit and the voice analysis; and an operation mode determination unit determining an operation mode in which crime prevention equipment possessed by the user is activated according to the level of danger identified by the danger identification unit, and transmitting a signal corresponding to the operation mode to the user terminal.

The image analysis unit may recognize a face of the person from the image of the person and extract a motion of an arm of the person.

The search word may include slang and a word requesting help, and the voice analysis unit may detect the number of

times that frequencies equal to or higher than a preset frequency are generated, from the frequency of the voice, and detect the number of times that the slang and word requesting help are generated.

Levels of danger may be classified into no danger, a low level of danger, and a high level of danger, and the danger identification unit may select one of the no danger, the low level of danger, and the high level of danger according to analysis results of the image analysis unit and the voice analysis unit.

The crime prevention equipment possessed by the user may be in plurality and the operation mode determination unit may determine an operation mode corresponding to the level of danger identified by the danger identification unit among a plurality of operation modes in which a plurality of pieces of crime prevention equipment possessed by the user is selectively activated.

The operation mode determination unit may output an operation mode signal that inactivates all of the plurality of pieces of crime prevention equipment when the danger identification unit selects the no danger.

The operation mode determination unit may output an operation mode signal that activates any one of the plurality of pieces of crime prevention equipment when the danger identification unit selects the low level of danger.

The operation mode determination unit may output an operation mode signal that activates all of the plurality of pieces of crime prevention equipment when the danger identification unit selects the high level of danger.

The crime prevention equipment may include one or more of a stun gun, a gas sprayer, and a hydrochloric acid sprayer.

The crime prevention equipment may be disposed in a user's vest, bracelet, necklace, belt, bag, shoulder strap, or gloves.

The device may further include an image/voice storage unit storing an image and voice from the user terminal.

The device may further include a notification unit notifying an external contact that the user is in danger, according to the level of danger identified by the danger identification unit.

In another embodiment, a method of controlling activation of crime prevention equipment includes extracting an image of a person from the user terminal and analyzing a motion of the person based on the extracted image of the person, by an image analysis unit; analyzing a frequency of voice from the user terminal and extracting a preset search word from the voice, by a voice analysis unit; identifying a level of danger of a user by a danger identification unit based on a result of the analysis; and determining, by an operation mode determination unit, an operation mode in which crime prevention equipment possessed by the user is activated according to the level of danger identified by the identifying of the level of danger of the user, and transmitting an operation mode signal corresponding to the operation mode to the user terminal.

The analyzing of the motion of the person may include recognizing a face of the person from the image of the person and extracting a motion of an arm of the person.

The search word may include slang and a word requesting help, and the analyzing of the frequency of the voice and the extracting of the preset search word from the voice may include detecting the number of times that frequencies equal to or higher than a preset frequency are generated, from the frequency of the voice, and detecting the number of times that the slang and word requesting help are generated.

The method may further include storing, by an image/voice storage unit, an image and voice from the user terminal.

The method may further include notifying, by a notification unit, an external contact that the user is in danger, according to the level of danger identified by the identifying of the level of danger of the user.

#### Advantageous Effects

According to the present disclosure of such a configuration, it is possible to fundamentally block the accidental use of crime prevention equipment by activating the crime prevention equipment only in an actually dangerous situation, not by mistake or for fun when a user, such as a child attempts to operate the crime prevention equipment.

In addition, it is possible to change the operation mode of the crime prevention equipment in response to a degree of a dangerous situation in which a user, such as a child is.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a network to which the present disclosure has been applied.

FIG. 2 is an internal block diagram of a user terminal in FIG. 1.

FIG. 3 is an internal block diagram of a device for controlling the activation of crime prevention equipment according to an embodiment of the present disclosure.

FIG. 4 is a graph of an example of a voice frequency which is employed in voice analysis by a voice analysis unit in FIG. 3.

FIG. 5 is a flowchart of the action of a user terminal in FIG. 2.

FIG. 6 is a flowchart of a method of controlling the activation of crime prevention equipment according to an embodiment of the present disclosure.

#### MODE FOR CARRYING OUT THE INVENTION

In the following, a device and method for controlling the activation of crime prevention equipment according to an embodiment of the present disclosure is described with reference to the accompanying drawings. Before the detailed description of the present disclosure, the terms or words used in the specification and claims as will be provided below should not be construed limitatively as a typical or literary meaning. Thus, since embodiments in the specification and configurations in the drawings are only exemplary embodiments of the present disclosure and do not thoroughly represent the technical spirit of the present disclosure, it should be noted that there may be various equivalents and variations that may replace them when the present application is filed.

FIG. 1 illustrates a network to which the present disclosure has been applied.

In the present disclosure, it is assumed that a user (e.g., a child) possesses a user terminal **10** or **20** and crime prevention equipment **12** or **22**.

The user terminal **10** or **20** only needs to transmit image data, voice data, position information, etc. to a server **40** through a network **30** and receive an operation mode signal from the server to perform an operation corresponding thereto.

The crime prevention equipment **11** or **22** may be disposed at a user's vest, bracelet, necklace, belt, gloves, etc. In this example, the crime prevention equipment **12** or **22** may

be a stun gun, gas sprayer, hydrochloric acid sprayer, etc. The gas sprayer sprays a tear gas and may also be equipment that sprays a tear liquid. The configurations and actions of the stun gun, gas sprayer and hydrochloric acid sprayer may be sufficiently understood from known technologies by a person skilled in the art. Although the stun gun or gas sprayer may be disposed at the user's vest, bracelet, necklace, belt, etc., the stun gun, gas sprayer and hydrochloric acid sprayer may also be disposed together. The crime prevention equipment **11** or **22** may be any equipment that sprays instantaneous adhesives in addition to the stun gun, gas sprayer, and hydrochloric acid sprayer. The crime prevention equipment **12** or **22** is activated or inactivated based on an input operation mode signal.

In the following embodiments of the present disclosure, it is assumed that the stun gun, gas sprayer and hydrochloric acid sprayer are disposed at the user's vest, bracelet, necklace, belt, gloves, etc.

The server **40** is a device that may control the activation of the crime prevention equipment **12** or **22** remotely. The server **40** receives image data, voice data, position data, etc. from the user terminal **10** or **20** through the network **30**, determines a level of danger in which a corresponding user is currently, and transmits a corresponding operation mode (i.e., operation mode in which the crime prevention mode **12** or **22** is activated) signal to a corresponding user terminal **10** or **20**.

FIG. 2 is an internal block diagram of a user terminal in FIG. 1. FIG. 1 shows two user terminals **10** and **20** but it is considered that there is a need to describe only the user terminal **10** because the two user terminals **10** and **20** have the same configuration in terms of function.

The user terminal **10** includes a camera **50**, a microphone **52**, an image processing unit **54**, a voice processing unit **56**, a position tracking unit **58**, a transmission unit **60**, a reception unit **62**, an emergency button unit **64**, and a control unit **66**.

The camera **50** images things around a user as well as the user. That is, the camera **50** may automatically operate to image a user in front of the camera and things around the user (including a person who attempts to commit a crime), when the emergency button (not shown) of the emergency button unit **64** is ON. The camera **50** may be used to image the person who attempts to commit a crime. The camera **50** may be in plurality. When the camera **50** is in plurality, it is possible to image many situations in front of the camera and thus it is possible to contribute to crime prevention more efficiently.

The microphone **52** collects the voice (vocalization) of the person who attempts to commit a crime as well as the voice (vocalization) of the user. The microphone **52** automatically operates when the emergency button (not shown) of the emergency button unit **64** is ON.

The image processing unit **54** removes noise from an image imaged by the camera **50** and converts the image into a data format that may be transmitted to the server **40**. In this example, since a data format conversion technique in the image processing unit **54** may be fully understood from a known technology by a person skilled in the art, related descriptions are not provided.

The voice processing unit **56** removes noise from voice collected by the microphone **52** and converts the voice into a data format that may be transmitted to the server **40**. In this example, since a data format conversion technique in the voice processing unit **56** may be fully understood from a known technology by a person skilled in the art, related descriptions are not provided.

The position tracking unit **58** tracks the position of a corresponding user terminal **10** to output position information. For example, the position tracking unit **58** may use a global positioning system (GPS) to track the position of a corresponding user terminal **10**. Besides the GPS, it is possible to identify the position through WCDMA or WiFi and it is also possible to identify the position by together applying the technologies as described above. WCDMA or WiFi may solely identify the position on behalf of the GPS technology but is poorer in precision than the position identification through the GPS. Thus, WCDMA or WiFi may perform a role in assisting the position identification through the GPS in a shadow area that may not receive a signal from a satellite.

The transmission unit **60** transmits image data from the image processing unit **54**, voice data from the voice processing unit **56**, and position information from the position tracking unit together to the server **40** through the network **30**. The transmission unit **60** may transmit identification information (e.g., ID) on a corresponding user terminal when transmitting the image data, voice data and position data. The server **40** may identify from which user terminal the information is transmitted, only when the identification information on a corresponding user terminal **10** is together transmitted.

The reception unit **62** receives an operation mode received from the server **40** through the network **30**.

The emergency button unit **64** is controlled when a user is in danger. The emergency button unit **64** includes an emergency button (not shown).

As the emergency button of the emergency button unit **64** is ON, the control unit **66** automatically operates the camera **50** and microphone **52** to transmit the image data, voice data and position data from the image processing unit **54**, voice processing unit **56** and position tracking unit **58** to the server **40**. In addition, the control unit **66** activates or inactivates the crime prevention equipment **12** based on an operation mode signal received by the reception unit **62**.

FIG. 3 is an internal block diagram of a device for controlling the activation of crime prevention equipment according to an embodiment of the present disclosure, and FIG. 4 is a graph of an example of a voice frequency which is employed in voice analysis by a voice analysis unit in FIG. 3.

The device for controlling the activation of the crime prevention equipment according to the embodiment of the present disclosure, namely, the server **40** includes a reception unit **70**, an image analysis unit **72**, a voice analysis unit **74**, a danger identification unit **76**, a contact storage unit **78**, a notification unit **80**, an operation mode determination unit **82**, a transmission unit **84**, and an image/voice storage unit **86**.

The reception unit **70** receives image data, voice data and position information received from the user terminal **10** or **20** through the network **30**.

The image analysis unit **72** extracts an image of a person from the user terminal **10**, **20** and analyzes the motion of the person based on the extracted image of the person.

The image analysis unit **72** recognizes the face (or pupil) of the person from the image of the person and extracts the state and motion of the arm of the person in order to identify whether the person attempts to commit a crime. The face recognition of the person is needed for further notice. Since the person who attempts to commit a crime often holds the user, extracting the current state of the arm of the person and the motion of the arm would be helpful in identifying a crime attempt. In this example, since the face recognition

and extracting the motion of the arm may be fully understood from a known technology by a person skilled in the art, related descriptions are not provided.

The image analysis unit **72** may also first perform an operation of removing noise from an image from the user terminal **10** or **20** as needed.

The voice analysis unit **74** analyzes the frequency of voice from the user terminal **10** or **20** and analyzes a preset search word from the voice. In this example, the search word may include slang, a word requesting help, etc.

The voice analysis unit **74** detects the number of times that frequencies **74a** and **74b** equal to or higher than a preset frequency are generated, from the frequency of the input voice as shown in FIG. 4. In addition, the voice analysis unit **74** detects the number of times that the slang and the word requesting help are generated. The frequencies **74a** and **74b** equal to or higher than the preset frequency may correspond to a scream provided by a user.

In order to detect the number of times that the slang and the word requesting help are generated, the voice analysis unit **74** may first detect the start point and end point of the voice from vocalization by using the end point detection of the voice to detect voice activity. In this example, the end point detection of the voice may be fully understood from a known art by a person skilled in the art. Then, it is determined whether the vocalization of the detected voice activity matches pre-stored reference vocalization (i.e., reference vocalization for slang, a word requesting help, etc.), and if positive, the number of times that the slang or word requesting help is generated increases by +1. In this case, the voice analysis unit **74** may be considered that it uses a voice recognition technology, which may be fully understood from a known art by a person skilled in the art.

The voice analysis unit **74** may also perform an operation of removing noise from voice from the user terminal **10** or **20** as a top priority.

The danger identification unit **76** identifies a level of danger of a user at the current position based on position information and the analysis results of the image analysis unit **72** and the voice analysis unit **74**. In this example, levels of danger may be classified into no danger, a low level of danger, and a high level of danger. That is, the danger identification unit **76** selects one of the no danger, the low level of danger and the high level of danger according to the analysis results of the image analysis unit **72** and the voice analysis unit **74**.

For example, when data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when there is no image of another person, no frequencies **74a** and **74b** equal to or higher than a preset frequency are generated and no slang and word requesting help are generated, the danger identification unit **76** may select the no danger. When data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when there is no image of another person and no frequencies **74a** and **74b** equal to or higher than a preset frequency are generated or no slang and word requesting help are generated, the danger identification unit **76** may select the no danger. When data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when there is an image of another person but no frequencies **74a** and **74b** equal to or higher than a preset frequency are generated and no slang and word requesting help are generated, the danger identification unit **76** may select no danger.

In addition, when data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when another person holds a user, the frequencies **74a** and **74b**

equal to or higher than a preset frequency is generated less than a certain number of times (e.g., five times) and the slang and word requesting help are generated less than a certain number of times (e.g., five times), the danger identification unit **76** may select the low level of danger. When data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when another person holds a user and the frequencies **74a** and **74b** equal to or higher than a preset frequency are generated more than a certain number of times (e.g., five times), the danger identification unit **76** may select the low level of danger. When data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when another person holds a user and the slang and word requesting help are generated more than a certain number of times (e.g., five times), the danger identification unit **76** may select the low level of danger. When data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when another person does not hold a user but the frequencies **74a** and **74b** equal to or higher than a preset frequency is generated more than a certain number of times (e.g., five times) and the slang and word requesting help are generated more than a certain number of times (e.g., five times), the danger identification unit **76** may select the low level of danger.

In addition, when data from the image analysis unit **72** and the voice analysis unit **72** is data corresponding to when another person holds a user, the frequencies **74a** and **74b** equal to or higher than a preset frequency is generated more than a certain number of times (e.g., five times) and the slang and word requesting help are generated more than a certain number of times (e.g., five times), the danger identification unit **76** may select the high level of danger.

The certain number of times provided as five times is only an example and may be fully adjusted without a limitation thereto. Also, combinations of the no danger, low level of danger and high level of danger that are provided as examples above may vary.

The contact storage unit **78** stores contact information by user. In this example, the contact information may vary according to the low level of danger and the high level of danger. For example, in the case of the low level of danger, the contact information may be mapped to be capable of contacting only with the parents of a corresponding user. In the case of the high level of danger, the contact information may be mapped to be capable of contacting with all of the parents of a corresponding user, a police station, etc.

The notification unit **80** notifies an external contact that the user is in danger, based on information in the contact storage unit **78** according to the level of danger identified by the danger identification unit **76**. In this case, when the level of danger identified by the danger identification unit **76** is the low level of danger, the notification unit **80** may call the parents of a corresponding user and/or transmit a SMS message to them. When the level of danger identified by the danger identification unit **76** is the high level of danger, the notification unit **80** may call the parents of a corresponding user, a police station, etc. and/or transmit a SMS message to them.

The motion mode determination unit **82** determines an operation mode in which the crime prevention equipment **12** or **22** possessed by a corresponding user is activated according to the level of danger identified by the danger identification unit **76**, and transmits a corresponding signal to a corresponding user terminal or **20**. In this case, when the crime prevention equipment possessed by a user is in plurality, the motion mode determination unit **82** determines an operation mode that corresponds to the level of danger identified by

the danger identification unit **76** among a plurality of operation modes in which a plurality of pieces of crime prevention equipment possessed by the user is selectively activated. For example, when the danger identification unit **76** selects the no danger, the operation mode determination unit **82** may output an operation mode signal that enables the plurality of pieces of crime prevention equipment to be all inactivated. When the danger identification unit **76** selects the low level of danger, the operation mode determination unit **82** may output an operation mode signal that activates any one (e.g., a stun gun) of the plurality of pieces of crime prevention equipment. When the danger identification unit **76** selects the high level of danger, the operation mode determination unit **82** may output an operation mode signal that activates all (e.g., a stun gun, gas sprayer and hydrochloric acid sprayer) of the plurality of pieces of crime prevention equipment.

The transmission unit **84** transmits the operation mode signal output from the operation mode determination unit **82** to a user terminal through the network **30**.

The image/voice storage unit **86** stores images and voice from the user terminal **10** or **20**. This is needed for identifying and reporting another person who has attempted to commit a crime.

In FIG. 3, the image analysis unit **72** and the voice analysis unit **74** may be examples of the analysis unit set forth in the claims of the present disclosure. The analysis unit set forth in the claims of the present disclosure receives and analyzes audiovisual information (i.e., an image or voice) from the user terminal **10** or **20**. Thus, the analysis unit set forth in the claims of the present disclosure may be understood as collectively representing the image analysis unit **72** and the voice analysis unit **74**.

Next, the actions of the user terminal in FIG. 2 is described with reference to the flowchart of FIG. 5.

When a user makes the emergency button of the emergency button unit **64** ON (Yes in step S10), the control unit **66** automatically operates the camera **50** and the microphone **52**.

Thus, the camera **50** images things in front of the camera, and the microphone **52** collects voice from the position of a corresponding user in step S12.

The imaged image is transmitted to the image processing unit **54** and the collected voice is transmitted to the voice processing unit **56**. Thus, the image processing unit **54** removes noise from the image imaged by the camera **50** and converts the image into a data format that may be transmitted to the server **40**. The voice processing unit **56** removes noise from the voice collected by the microphone **52** and converts the voice into a data format that may be transmitted to the server **40**.

The image data and voice data converted in this way is transmitted to the server **40** through the transmission unit **60** along with current position information on a corresponding user from the position tracking unit **58**. In this case, identification information (e.g., ID) on a corresponding user terminal **10** is also transmitted together.

Then, when the reception unit **62** of the corresponding user terminal **10** receives an operation mode signal from the server **40** (Yes in step S16), the control unit **66** activates the crime prevention equipment **12** according to the type of the operation mode signal received by the reception unit **62** in step S18. For example, when the received operation mode signal is a signal that inactivates all of the plurality of pieces of crime prevention equipment (i.e., a signal corresponding to the no danger), the plurality of pieces of crime prevention equipment possessed by the corresponding user do not

operate. When the received operation mode signal is a signal that activates any one (e.g., a stun gun) of the plurality of pieces of crime prevention equipment (i.e., a signal corresponding to the low level of danger), only the stun gun is activated. When the received operation mode signal is a signal that activates all (e.g., a stun gun, gas sprayer and hydrochloric acid sprayer) of the plurality of pieces of crime prevention equipment (i.e., a signal corresponding to the high level of danger), all of the stun gun, gas sprayer, and hydrochloric acid sprayer are activated.

Thus, when the operation mode signal corresponding to the no danger is received, any equipment does not operate even when a user attempts to operate any of the plurality of pieces of crime prevention equipment.

When the operation mode signal corresponding to the low level of danger is received, a user may operate the stun gun to become free from danger because e.g., the stun gun is activated.

When the operation mode signal corresponding to the high level of danger is received, the user may operate one or more of the stun gun, gas sprayer, and hydrochloric acid sprayer to become free from danger because e.g., all of the stun gun, gas sprayer, and hydrochloric acid sprayer are activated.

Lastly, a method of controlling the activation of crime prevention equipment according to an embodiment of the present disclosure is described with reference to a flowchart of FIG. 6.

Firstly, the reception unit **70** receives image data, voice data and position information from a user terminal **10**, for example. The received image data and voice data stored in the image/voice storage unit **86** in step S20.

Subsequently, the image analysis unit **72** extracts an image of another person from an image from the user terminal **10** and analyzes the motion of the another person based on the extracted image of the other person, and the voice analysis unit **74** analyzes the frequency of voice from the user terminal **10** and extracts a preset search word from the voice, in step S22.

Then, the danger identification unit **76** identifies a level of danger of a user at the current position (any one of no danger, a low level of danger, and a high level of danger) based on the position information and the analysis results of the image analysis unit **72** and the voice analysis unit **74** in step S24.

If the identified level of danger is the no danger, the motion mode determination unit **82** determines an operation mode in which all of the pieces of crime prevention equipment possessed by a corresponding user are inactivated, in step S26.

When the identified level of danger is the low level of danger, the operation mode determination unit **82** determines an operation mode in which only any one of the pieces of crime prevention equipment possessed by a corresponding user is activated, in step S28. In this case, when the identified level of danger is the low level of danger, the notification unit **80** calls the parents of a corresponding user and/or transmits a SMS message to them, although not shown in FIG. 6.

If the identified level of danger is the high level of danger, the motion mode determination unit **82** determines an operation mode in which all of the pieces of crime prevention equipment possessed by a corresponding user are activated, in step S30. In this case, when the identified level of danger is the high level of danger, the notification unit **80** calls the

parents of a corresponding user, a police station, etc. and/or transmits a SMS message to them, although not shown in FIG. 6.

Then, a signal (i.e., operation mode signal) corresponding to the operation mode determined by the operation mode determination unit 82 is transmitted to a user terminal through the transmission unit 84 in step S32.

The above-described crime prevention equipment 12 or 22 may be disposed in a bag or shoulder strap. In this case, the crime prevention equipment 12 or 22 disposed in the bag or shoulder strap may have sound recording and video recording independently from the camera 50 and microphone 52 of the user terminal 10 or 20. When the crime prevention equipment 12 or 22 is disposed in the shoulder strap in this way, it is possible to image things in front of another person who attempts to commit a crime, from the shoulder height of a corresponding child and it is possible to later monitor a path from home to school of a corresponding child. Thus, the crime prevention equipment 12 or 22 disposed in the bag or shoulder strap may be a device, such as a personal black box.

When the above-described crime prevention equipment 12 or 22 is disposed in a vest, a rechargeable solar battery is disposed in the vest and a non-isolated conductor is connected to the solar battery. One or more non-isolated conductors are disposed in the vest. In this case, when the above-described crime prevention equipment 12 or 22 is activated, a current flows into the non-isolated conductor and thus it is possible to apply an electric shock to another person who attempts to commit a crime.

When the above-described crime prevention equipment 12 or 22 is disposed in the gloves, it is possible to accurately apply an electric shock, spray a gas and spray hydrochloric acid to another person who attempts to commit a crime.

Optimal embodiments have been disclosed in the drawings and in the specification as discussed above. Although specific terms are used herein, they are used for the purpose of describing the present disclosure and not used in order to limit the scope of the present disclosure set forth in the claims. Therefore, a person skilled in the art would understand that various variations and equivalent embodiments may be implemented from the present disclosure. Thus, the true technical protective scope of the present disclosure would be defined by the technical spirit of the claims.

The invention claimed is:

1. A device for controlling activation of crime prevention equipment, the device comprising:

an analysis unit analyzing audio visual information from a user terminal;

a danger identification unit identifying a level of danger of a user based on a result of the analysis unit; and

an operation mode determination unit determining an operation mode in which the crime prevention equipment possessed by the user is activated according to the level of danger identified by the danger identification unit, and transmitting an operation mode signal corresponding to the operation mode to the user terminal, wherein the analysis unit comprises:

an image analysis unit extracting an image of a person from the user terminal and analyzing a motion of the person based on the extracted image of the person, and a voice analysis unit analyzing a frequency of a voice from the user terminal and extracting a preset search word from the voice.

2. The device according to claim 1, wherein the user terminal activates the crime prevention equipment based on

the operation mode signal and the crime prevention equipment operates when an operation ON command is input in an activation state.

3. The device according to claim 1, wherein the image analysis unit recognizes a face of the person from the image of the person and extracts a motion of an arm of the person.

4. The device according to claim 1, wherein the search word comprises slang and a word requesting help, and the voice analysis unit detects the number of times that frequencies equal to or higher than a preset frequency are generated, from the frequency of the voice, and detects the number of times that the slang and word requesting help are generated.

5. The device according to claim 1, wherein the level of danger includes a no danger level, a low level of danger, and a high level of danger, and the danger identification unit selects one of the no danger level, the low level of danger, and the high level of danger according to an analysis result of the analysis unit.

6. The device according to claim 5, wherein the crime prevention equipment possessed by the user is in plurality and the operation mode determination unit determines an operation mode corresponding to the level of danger identified by the danger identification unit among a plurality of operation modes in which a plurality of pieces of crime prevention equipment possessed by the user is selectively activated.

7. The device according to claim 6, wherein the operation mode determination unit outputs an operation mode signal that inactivates all of the plurality of pieces of crime prevention equipment when the danger identification unit selects the no danger level.

8. The device according to claim 6, wherein the operation mode determination unit outputs an operation mode signal that activates any one of the plurality of pieces of crime prevention equipment when the danger identification unit selects the low level of danger.

9. The device according to claim 6, wherein the operation mode determination unit outputs an operation mode signal that activates all of the plurality of pieces of crime prevention equipment when the danger identification unit selects the high level of danger.

10. A device for controlling activation of crime prevention equipment, the device comprising:

an analysis unit analyzing audio visual information from a user terminal;

a danger identification unit identifying a level of danger of a user based on a result of the analysis unit; and

an operation mode determination unit determining an operation mode in which the crime prevention equipment possessed by the user is activated according to the level of danger identified by the danger identification unit, and transmitting an operation mode signal corresponding to the operation mode to the user terminal,

wherein the crime prevention equipment comprises one or more of a stun gun, a gas sprayer, and a hydrochloric acid sprayer.

11. The device according to claim 1, wherein the crime prevention equipment is disposed in a user's vest, bracelet, necklace, belt, bag, shoulder strap, or gloves.

12. The device according to claim 1, further comprising an image/voice storage unit storing the image and voice from the user terminal.

13. The device according to claim 1, further comprising a notification unit notifying an external contact that the user is in danger, according to the level of danger identified by the danger identification unit.

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14. A method of controlling activation of crime prevention equipment, the method comprising:

analyzing audio visual information from a user terminal by an analysis unit;

identifying a level of danger of a user by a danger identification unit based on a result of the analysis; and

determining, by an operation mode determination unit, an operation mode in which the crime prevention equipment possessed by the user is activated according to the level of danger identified by the danger identification unit, and transmitting an operation mode signal corresponding to the operation mode to the user terminal,

wherein the analyzing of the audio visual information comprises:

extracting an image of a person from the user terminal and analyzing a motion of the person based on the extracted image of the person; and

analyzing a frequency of a voice from the user terminal and extracting a preset search word from the voice.

15. The method according to claim 14, wherein the user terminal activates the crime prevention equipment based on

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the operation mode signal and the crime prevention equipment operates when an operation ON command is input in an activation state.

16. The method according to claim 14, wherein the analyzing of the motion of the person comprises recognizing a face of the person from the image of the person and extracting a motion of an arm of the person.

17. The method according to claim 14, wherein the search word comprises slang and a word requesting help, and the analyzing of the frequency of the voice and the extracting of the preset search word from the voice comprises detecting the number of times that frequencies equal to or higher than a preset frequency are generated, from the frequency of the voice, and detecting the number of times that the slang and word requesting help are generated.

18. The method according to claim 14, further comprising storing, by an image/voice storage unit, the image and voice from the user terminal.

19. The method according to claim 14, further comprising notifying, by a notification unit, an external contact that the user is in danger, according to the level of danger identified by the danger identification unit.

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